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D3

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(54) **Absorbent pad**

(57) Absorbent pad, e.g. sanitary napkin, comprises absorbent batt (11) which contains a thermoplastic material and is folded on itself at least once, the folds being maintained by fusing (13).

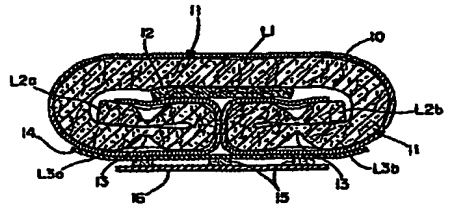

FIG. 2

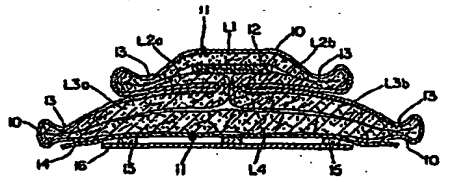

FIG. 3

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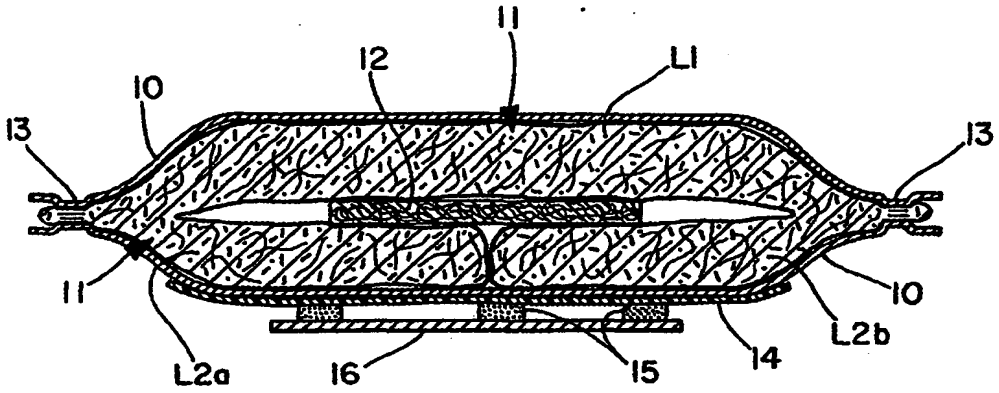

FIG. 1

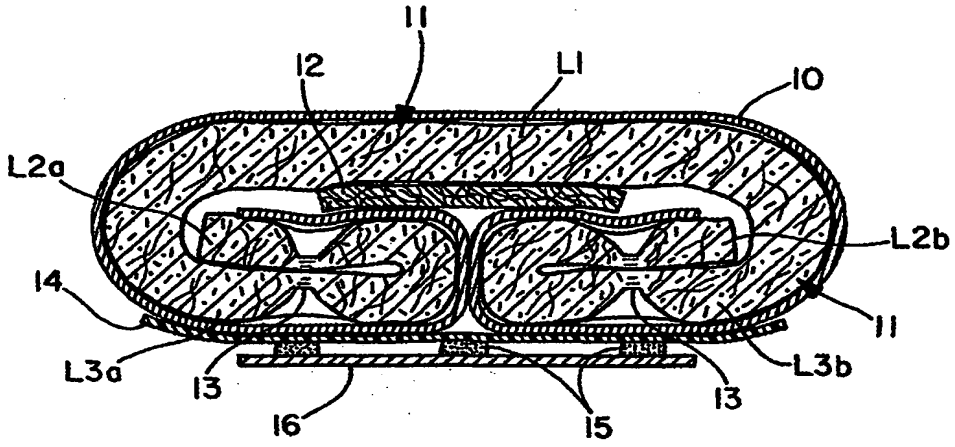

FIG. 2

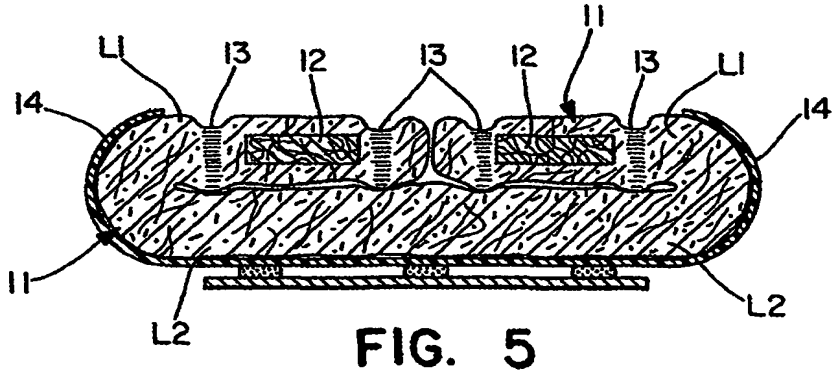

FIG. 5

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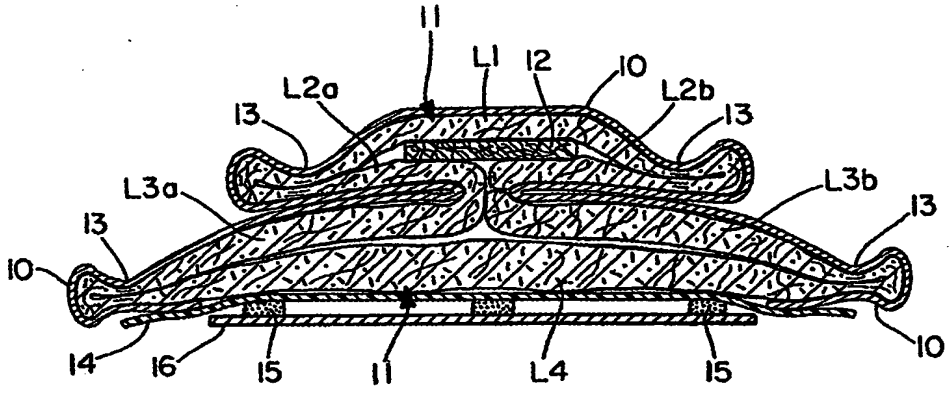

FIG. 3

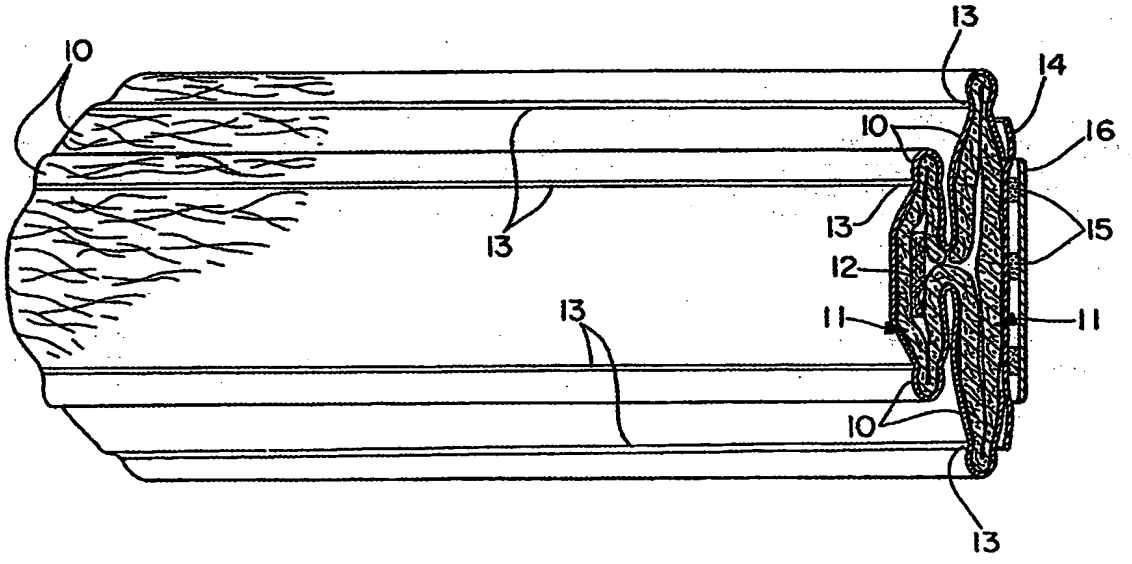

FIG. 4

SPECIFICATION

Absorbent pad

The present invention relates to an absorbent pad, and in particular to an absorbent pad such as a sanitary napkin containing thermoplastic material.

Absorbent pads such as sanitary napkins which utilize cellulosic fibre as their principal absorbent, are well known.Cellulosic fibre provides a relatively inexpensive source of absorbent material but suffers from distinct disadvantages when utilized alone as an absorbent layer. One of the main disadvantages is that when a layer of cellulosic fibre is wet, it tends to collapse upon itself with the result that a saturated cellulosic fibre is dense, compacted, and relatively hard and uncomfortable.

This disadvantage has been recognised and consequently thermoplastic fibres have been added to batts of cellulosic fibres in an attempt to retain the relatively inexpensive source of absorbency while introducing resistance to a permanent deformation and also resilience. Representative examples of absorbent pads made with this mixture of fibres can be found in U.S. Patent Nos. 4,082,886; 4,129,132; 3,976,074; 4,054,141; 4,047,531; 3,545,441; 4,219,024; and 4,100,324. It has also been noted that when a layer of absorbent material containing thermoplastic fibres is folded upon itself, resiliency in the sanitary product containing this folded absorbent layer is increased even further.

There are difficulties inherent in using thermoplastic material in a cellulosic absorbent batt. The introduction of a thermoplastic material can decrease absorbent capacity and can also diminish the capillary attraction for the fluid to be absorbed. In order to counteract these problems, additional absorbent materials which absorb high levels of fluid per unit volume may be introduced underneath the absorbent layer or, in the case of a folded thermoplastic containing absorbent layer, such a highly absorbent insert may be positioned within the fold. An absorbent pad such as the one described above is described in more detail in U.S. Patent Application Serial No. 266,795. This particular application discribes an absorbent insert made of surfactant treated meltblown microfiber.

When a sanitary napkin or the like is designed with a folded absorbent layer containing thermoplastic material and an absorbent insert is positioned within the fold, the precise positioning of the absorbent inset is important. The absorbent insert, for example, wood pulp fluff, surfactant treated meltblown microfibre, superabsorbents, or the like performs its function of high fluid retention per unit volume due at least partly to its relatively small capillary size compared to the cover. The small capillaries help to draw fluid through the upper layer and preferentially absorb fluid until the capacity of this layer is substantially utilized. If this absorbent insert was not positioned properly, or if the insert was repositioned during wear, the benefits derived from the presence of the insert would be minimized.

Recently, sanitary napkins have been designed with increasing bulk in the central napkin portion. One way of obtaining this increased bulk is by folding the absorbent layer so that an extra fold exists in the central portion of the napkin. This extra thickness, however, is difficult to maintain in the proper position.

Examples of patents describing folded absorbent layers in napkins are U.S. Patent Nos. 3,667,468, 3,954,107, 3,699,966 and 3,364,931. U.S. Patent No. 3,183,909 is an example of a patent disclosing a sanitary napkin with a raised central layer.

According to the present invention there is provided an absorbent pad comprising a fluid impermeable baffle and an absorbent batt containing a fusible thermoplastic component, said batt being folded upon itself at least once with an attached portion present within said fold to unite and maintain the folded configuration.

Thus there is provided an absorbent pad, being in particular a sanitary napkin, in which an absorbent layer containing thermoplastic material is folded upon itself at least once, this folded configuration being maintained and stabilised by bonding, for example by fusion of the thermoplastic material from one layer of the fold to the other.

The embodiments of the present invention broadly embody the maintaining of folds in an absorbent material containing fusible thermoplastic fibres or powder by fusing selected portions of the respective layers of the fold. Suitable thermoplastic fibres or powder which may be utilized are those made from polyester, polypropylene, acrylic or nylon fibres or blend. Particularly preferred are low melting point fusible fibres such as vinyon, a vinyl chloride/vinyl acetate copolymer sold by Avtex Fibres, Inc. of New York, Eastman 410 morphis or crystaline polyester fibre sold by Eastman Chemical Products, Inc., a subsidiary of Eastman Kodak Co., Kingsport, Tennessee; or Chisso ES, a bicomponent polypropylene/polyethylene fibre sold by Chisso Limited, Osaka, Japan, which due to its differential melting point for each component of the fibre may have specific advantages in certain environments.

The fusing itself can be done by a variety of means such as hot calendar embossing or by ultrasonic means, with the latter being preferred.

Fusing is preferably performed along a continuous or discontinuous line extending longitudinally along most, if not all, of the length of the sanitary napkin and is generally inset only slightly from the fold to be maintained. Since the fluid permeable wrap utilized in conventional sanitary appliances such as a sanitary napkin is made of a thermoplastic material it generally helps join the cover to the absorbent layer. In the particular embodiments discussed subsequently the cover is in the form of a coextensive layer with the absorbent and as such will be part of any fused barrier formed.

It is known to form a fluid migration barrier utilizing fused lines which are continuous in nature and for this

reason, such lines can be particularly beneficial when used in certain embodiments described below. This is in contradistinction to an irregular or space pattern which would not necessarily provide the more complete fluid migration barrier protection which is desirable.

While the specific embodiments discussed relate to longitudinally fused patterns, other folded patterns may also be maintained.

Some embodiments of the invention will now be described by way of example only and with reference to the accompanying drawings in which:-

Figures 1, 2, 3 and *5* are end cross-sectional views of different embodiments of the absorbent pad of this invention;

Figure 4 is a plan view of the embodiment depicted at Figure 3.

The embodiment depicted in Figure 1 shows a sanitary napkin having an absorbent layer 11 containing thermoplastic material wrapped by a nonwoven thermoplastic wrap 10 and folded back along itself to form a top layer L1 and bottom folded layers L2a and L2b which abut each other near the central portion of the napkin. A thin extra absorbent layer 12 is positioned within the fold and is maintained in that position due to ultrasonic sealing lines 13 which extend substantially along the entire length of the pad near each longitudinal edge. The sanitary napkin has a fluid impermeable baffle 14 positioned on the bottom side of layers L2a and L2b. Three lines of garment attached adhesive 15 are attached to the baffle along with a release liner 16.

A secondary fluid permeable wrap may be utilized to encircle all of the components except for the adhesive lines 15 and the release liner 16 if desired.

A second embodiment is shown in Figure 2 where the additional fold is present as depicted by layers L3a and L3b. The first fold in this embodiment is not tacked. The secondary fold is maintained by the presence of an appropriately positioned ultrasonic fused area as was the case with the primary fold in Figure 1. It is possible, however, to separately fuse layers L1 to L2 in this configuration. If fusing is done separately, it is usually desirable to fold the napkin with the layer to be fused positioned first. In this case the layer not to be fused is then subsequently folded. In this particular embodiment, fusing of layers L2 to L3 is desirable as a process aid. Assembly of layers L3 to L2 and maintenance of those layers would be extremely difficult without some mechanism for attachment. These additional folded layers are particularly desirable as additional comfort enhancement. It has been discovered that resistance to deformation is increased by the thickness and the number of folds present in an absorbent batt containing thermoplastic fibres.

The embodiment depicted in Figure 3 is one in which four absorbent layers are present with layer L1 and L4 not being folded. The particular configuration illustrated in Figure 3 is one in which a raised centre area is utilized. The presence of the absorbent aid 12 in Figure 3 may be incorporated with fluid directing means or if the absorbent aid is the surfactant treated microfibrous insert described earlier, the insert itself may be used for this purpose. Multiple folded napkins with properly oriented flow directing means can provide for more even and complete utilization of absorbency with minimum amount of surface wetness. Figure 3 with an elevated centre is an example of a particular napkin configuration which has the potential to provide such utilization.

Figure 4 is a plan view of the elevated central portion of the napkin shown otherwise in Figure 3.

The embodiment shown in Figure 5 provides an open central area with a single fold, the folded portion being positioned on the upper portion of the napkin. Selected fuse lines and the placement of extra absorbent layer 12 provide yet another example of the combination of the folded product with fluid directing means. In this particular embodiment fluid comes only into contact with a small portion of the conventional absorbent layer 11 before it is imprisoned within the alternate absorbent layer 12. The remaining absorbent layers L1 and L2 are present firstly for comfort, and secondly, for overflow once the absorbent layer 12 is saturated. Fused lines 13 are particularly beneficial for fluid barrier purposes in this particular embodiment.

It should be noted that in this embodiment the baffle 14 extends along the bottom of th napkin, up the sides, and extends partially over each upper edge in the longitudinal direction. This baffle extension can be utilized in the embodiments previously depicted and also tends to add stability to napkins containing these folded resilient layers.

The embodiments of the absorbent pad described herein are, as a result of their composition, both resilient and shape-retaining.

An example of the side compression of napkins prepared according to the embodiment shown in Figure 2 as compared with a napkin which has been folded in the same manner but for which the folds have not been internally attached, is as follows.

Example

Samples for this example were prepared by trimming 1/2 inch from one of the longitudinal sides of the napkin. Each sample was positioned between a horizontally disposed compression apparatus having a Hunter Strain Guage with a 1/2 inch diameter circular surface positioned midway along the cut side of the napkin. The uncut side of the napkin was engaged by a 3/4 inch diameter compression cylinder midway along its side. (The napkin was cut to conform it to the space between the Guage and the compression cylinder but the folds and attachment were uncut). A top weight was applied by covering the body facing side of the napkin with a lucite block having dimensions 2 by 1 1/2 inches with the 2 inch side longitudinally

oriented and a weight was positioned on the block. Total weight applied to the napkin in the vertical direction was 128.7 gm.

Force was applied manually to the compression cylinder to compress the napkin by 15.6% in the longitudinal direction. (This was accomplished by means of a detent so that all samples were compressed equally).

This compressive force produced a reading on the Strain Guage and a comparison of the respective readings is set forth in the Table below. Two sets of values are presented comparing the napkin in a wet and a dry state. The napkins tested wet were treated by adding 5 ml. of a menstrual fluid analog in the centre of the pad. After the fluid was absorbed a second 5 ml. aliquot was added. The napkins were held for half an hour and then tested as described above. It should be noted that the fluid chosen is felt to have specific affect on this test although the amount is similar to a heavily loaded menstrual pad.

Pads	1	2	3	4	5	Condts,	Aver	Stand. Dev.
Folded with Bottom Baffle	70	120	55	85	90	dry	84	24.34
	95	125	75	80	95	wet	94	19.49
Tacked with Bottom Baffle	120	100	135	110	135	dry	120	15.41
	120	105	100	90	130	wet	109	15.97

CLAIMS

1. An absorbent pad comprising a fluid impermeable baffle and an absorbent batt containing a fusible thermoplastic component, said batt being folded upon itself at least once with an attached portion present within said fold to unite and maintain the folded configuration.
2. A pad as claimed in Claim 1 wherein fused areas form the attached portion.
3. A pad as claimed in Claim 1 or 2 having its longitudinal dimension greater than its transverse dimension and wherein said batt is folded along each longitudinal edge and at least one of said folds has a fused portion.
4. A pad as claimed in Claim 1, 2 or 3 wherein the fused portion is proximal to the fold.
5. A pad as claimed in Claim 1, 2, 3 or 4 wherein the fused portion is linear and extends parallel to said fold.
6. A pad as claimed in Claim 1, 2 or 3 wherein the absorbent batt comprises at least two congruent juxtaposed layers after folding.
7. A pad as claimed in Claim 1, 3 or 6 wherein the absorbent batt is folded to produce a thickened central portion with a fused portion present within said fold to unite and maintain said folded configuration.
8. An absorbent pad substantially as hereinbefore described and with reference to the accompanying drawings.

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